

## **REMARKS**

The last Office Action of September 16, 2002, has been carefully considered. Reconsideration of the instant application in view of the following remarks is respectfully requested.

Claims 1 to 8, 10 and 11 are pending in the application.

Claims 5 and 7 stand rejected under 35 U.S.C. §102(b) as being anticipated by Chesler et al. (US 3,860,000; hereinafter "Chesler").

Claims 1-3, and 6 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Maag et al. (U.S. Pat. No. 5,692,005 ; hereinafter "Maag").

Claims 4, 8 and 11 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Chesler.

Claim 10 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Maag, and further in view of Chesler.

## **REJECTION UNDER 35 U.S.C. §102(b)**

The rejection of claims 5 and 7 under 35 U.S.C. §102(b) as being anticipated by Chesler is hereby traversed and reconsideration thereof is respectfully requested.

Claim 5 recites a stable resonator with a laser rod, a convex rear mirror and a semi-reflecting output mirror, wherein the end of the laser rod facing the

rear mirror is planar, the other end of the laser rod is convex, and the output mirror is arranged in close proximity to the other end of the laser rod.

Chesler discloses a laser arrangement wherein the inequality  $f < P$  must be satisfied, i.e., the output mirror must be at a distance from the other end of the laser rod that is greater than the focal length of the positive lens, which can admittedly be formed by the convex shape of the other end of the laser rod. However, claim 1 recites that the output mirror is arranged in close proximity to the other end of the laser rod, which due to the condition  $f < P$  cannot be satisfied by Chesler.

Accordingly, Claim 5 therefore distinguishes over Chesler, and Applicant respectfully requests that the rejection of claim 5 over Chesler under 35 USC 102(b) be withdrawn.

As for the rejection of the retained dependent claims 7 and 11, these claims depend on claim 5 and share its presumably allowable features, and therefore it is respectfully submitted that these claims should also be allowed.

#### **REJECTION UNDER 35 U.S.C. §103(a)**

The rejection of claims 1-3 and 6 under 35 U.S.C. §103(a) as being unpatentable over Maag is hereby traversed and reconsideration thereof is respectfully requested.

Claim 1 is directed to a stable resonator for solid-state lasers, which exhibit a thermally induced lensing effect. The stable resonator includes a laser

rod, a rear mirror and a semi-reflecting output mirror. The rear mirror is convex, the end of the laser rod facing the rear mirror is also convex, and the output mirror is arranged in close proximity to the other end of the laser rod. The output mirror is semi-reflecting. Claims 2-3, and 6 depend from claim 1.

Maag discloses a solid state laser with a rod-shaped laser medium (1) with end faces (1.1, 1.2). The resonator of the solid-state laser is formed by a partially transparent decoupling mirror (3) and a highly reflective end mirror (2.1).

The examiner identified Maag's beam-shaping optics (7) with the convex rear mirror 12 of the instant application. However, Maag clearly states that the end mirror of the cavity is formed by surface 2.1 which is convex, whereas the beam-shaping optics (7) is provided to collimate the divergent emitted pumping radiation before it reaches the laser medium (1) to be excited, via the optical element (2). Accordingly, Maag fails to disclose an essential feature recited in claim 1, that *the rear mirror is convex*. Claim 1 therefore distinguishes over Maag, and Applicant respectfully requests that the rejection of claim 1 over Maag under 35 USC 103(a) be withdrawn.

As for the rejection of the retained dependent claims 2, 3, 6, and 10, these claims depend on claim 1 and share its presumably allowable features, and therefore it is respectfully submitted that these claims should also be allowed.

Addressing now the rejection of claim 4, the subject matter of claim 4 is directed to a stable resonator which includes a laser rod, a convex rear mirror and a semi-reflecting output mirror, wherein the end of the laser rod facing the rear mirror is planar, the other end of the laser rod is convex, and the output

mirror is formed by the other end of the laser rod, wherein this end is semi-reflecting. This arrangement is illustrated in Fig. 2b of the instant application (reproduced below):



FIG. 2b

Chesler discloses in Fig. 3 a stable resonator arrangement with an active laser element 35, a convex mirror surface 30, a positive lens 31 and a concave (output) mirror surface 32. Chesler also discloses that physically separate elements can be combined with the rod to achieve an equivalent configuration. Chesler's configuration requires that the condition  $f < P$  be satisfied.

Chesler's configuration depicted in Fig. 3 is reproduced below (reference numerals omitted), allowing for modifications suggested in col. 2, lines 50-55:

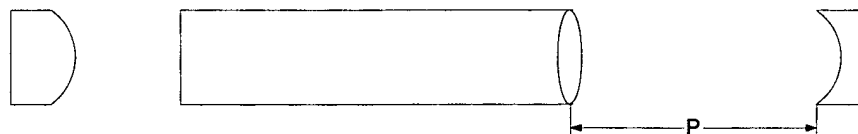


FIG. 3  
(Chesler)

Chesler's laser cavity is formed by the two mirrors. The laser end with the lens is not semi-reflecting. Even if the effect of the positive lens were replaced by giving the other end of the laser rod a convex shape, Chesler's concave mirror

surface could not be butted against the laser rod without violating the condition  $f < P$  stipulated by Chesler.

Unlike the convex mirror recited in claim 4 of the instant application, the redrawn laser arrangement (Fig. 4 of Chesler) shows a concave mirror on the left side.

Claim 4 therefore distinguishes over Chesler, and Applicant respectfully requests that the rejection of claim 4 over Chesler under 35 USC 103(a) be withdrawn.

As for the rejection of the retained dependent claim 8, this claim depends on claim 4 and shares its presumably allowable features, and therefore it is respectfully submitted that this claim should also be allowed.

Withdrawal under 35 U.S.C. §103(a) and allowance of claims 1-8, and 10-11 are thus respectfully requested.

Applicant also wishes to point out that the resonator disclosed in the instant application and Chesler's resonator were developed to satisfy entirely divergent requirements. Chesler attempts to achieve the greatest possible mode volume for the fundamental laser mode  $TEM_{00}$  with  $M^2 = 1$ , possibly for a fixed value of the thermal lens. The present resonator is a multimode resonator ( $M^2 \geq 20$ ) which is essentially independent of the pump power.

## **CONCLUSION**

Applicant believes that when the Examiner reconsiders the claims in the

light of the above comments, he will agree that the invention is in no way properly met or anticipated or even suggested by any of the references however they are considered.

In view of the above presented remarks, it is respectfully submitted that all claims on file should be considered patentably differentiated over the art and should be allowed.

Reconsideration and allowance of the present application are respectfully requested.

Should the Examiner consider necessary or desirable any formal changes anywhere in the specification, claims and/or drawing, then it is respectfully requested that such changes be made by Examiner's Amendment, if the Examiner feels this would facilitate passage of the case to issuance. If the Examiner feels that it might be helpful in advancing this case by calling the undersigned, applicant would greatly appreciate such a telephone interview.

Respectfully submitted,

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